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Microgrid project deadline nears. Do communities understand the concept?

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Norwich - It was only for a few hours during Tropical Storm Irene, but the William W. Backus Hospital here still got a hard lesson on what losing power in the heat of summer meant.

While the hospital has emergency generators, "they're not large enough to power everything," said Keith Fontaine, vice president and chief administrative officer. "There are red outlets all over the hospital that are for emergencies. All the operating rooms and inpatient units automatically switch over, but not everything --including air conditioning."

That's right, no AC plus the windows don't open.

So when the idea of microgrids was authorized for a pilot project as part of emergency preparedness legislation passed in the last legislative session, Backus Hospital jumped.

Microgrids are mini electric grids with their own power source, usually linked to the main power grid, but designed to keep running when that grid goes down. Think Irene, Sandy and the October 2011 snowstorm when it became clear that most cities and towns had no provisions for power to keep critical services running: from police and fire stations and wastewater treatment plants to gasoline stations and food sources. Or in the case of Backus -- hospitals.

The pilot project, believed to be the first in the nation, will provide $15 million in bond funding to an undetermined number of communities for any aspect of a microgrid except the actual generation - which would be the expensive stuff.

Working with Norwich Public Utilities, Backus came up with a plan to keep the hospital fully operational. It calls for four diesel generators, which Norwich Utilities happens to have unused as part of a 20-generator purchase it made a few years ago.

The plan is to place them in the woods across the Yantic River from the hospital, with connections that run under the river. The generators would automatically kick in when the grid goes down, with excess power diverted elsewhere. The state money would pay for the switching equipment and installation.

A diesel generator like the one Norwich Utilities wants to set up.

"Once that's done," Fontaine said, "it's as trouble free as you could ever hope to be from a power perspective."

But a system that sits idle most of the time waiting for an emergency may not be the microgrid the state is after. The goal is to achieve grid resiliency, to promote cleaner and more efficient energy (which means capturing and using the generator's waste heat) and to do it all economically.

Alex Kragie, special assistant to Department of Energy and Environmental Protection Commissioner Dan Esty and the point person for the microgrid project, explains it: ""The way to do that generally is to be able to run the generation that's in the microgrid as baseload generation -- so constantly running generation. And this generation will be capable of staying up when the larger grid goes down."

Islanding - in industry parlance.

"I'm not saying we wouldn't look at backup power-only sites," Kragie said. "But I'll bet you a lot of money the best projects are going to be ones that make use of power 24/7."

John Bilda, Norwich Utilities' general manager, said the hospital project fit the microgrid criteria on all counts. "You don't get too many things more critical than the only trauma center in eastern Connecticut," Bilda said.

"To build a baseload generator running 24/7 with only the interconnection being subsidized, I'm not so sure how the economics of that would work. Here's what I do know: This does work," he said of the hospital plan.

But experts were universally skeptical of the emergency-only concept.

"If you're only configuring it for backup or emergencies you've got the wrong system," said Tom Bourgeois, co -director of the U.S. Department of Energy's Northeast Clean Energy Application Center, deputy director of Pace University Law School's Energy and Climate Center and one of a scant handful of microgrid experts. "What you want for economic viability is a system that's going be operated a lot.

"The current system of reliability in many instances is emergency diesel generators and we call them a dead asset. You buy them and hope you don't use them."

Joel Rinebold, director of energy initiatives at the Connecticut Center for Advanced Technology, said economics is key. His organization is providing technical assistance to communities developing microgrid projects.

"If those backup units are much lower cost and not intended to run baseload, they may be an opportunity for return on investment," he said. But such a system might be missing the main point of a microgrid, he added.

"My vision," he said, "is that we have robust durable generation that can operate at parity with grid prices so that these facilities will provide ultra-clean, ultra-reliant, ultra-efficient generation."

The University of Hartford is also submitting a back-up energy only project to connect dormitories to existing emergency diesel generators.

"We're in a situation where we have a lot of it already in place. We don't need to spend $10 million," said Norm Young, associate vice president of facilities, planning and management who is applying for funding for the connection. "That's one of the beauties of our proposal."

But for communities that don't happen to have generators sitting around, there are serious financial hurdles among a host of potential impediments to developing a microgrid.

For the pilot program, time is one. Even with an extra month to submit project outlines -- now due Jan. 3 -- the huge learning curve meant some communities, including West Hartford, were unable to pull together all the pieces quickly enough.

"We were very interested and intrigued by it," said Robert Palmer, the town's director of plant and facility services. "But we decided not to put an application in for this round because of the aggressive timetable."

And despite what Kragie called "a full-on road show" that included many information sessions, webinars and a barrage of email advisories to dozens of communities that expressed initial interest in microgrids, most cities and towns are scrambling to meet the first deadline. Those who are invited to submit detailed proposals for final selection will be chosen from that group.

With just days to go in Glastonbury, which suffered devastating and prolonged outages in all three storms, Town Manager Richard Johnson said a proposal was being finalized that would likely include fulltime natural gas generation to run a core area that encompasses town hall, police and ambulance headquarters, an assisted living facility and the wastewater treatment plant.

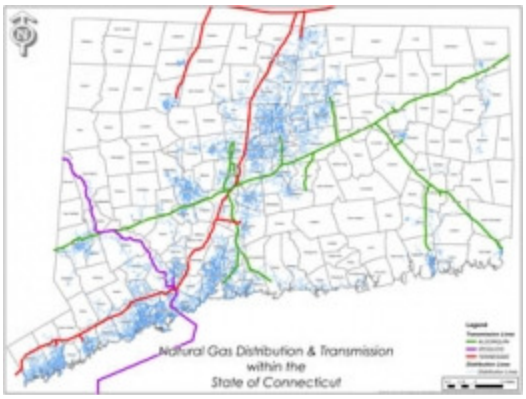
"We want to make a proposal that makes absolute sense," said Johnson, who has been working with an energy services company. "It's a big undertaking. This is not what you do on a daily basis -- establish microgrids. Even when you have the expertise there's a learning curve."

Another hurdle -- a number of generator options, including fuel cells, require natural gas, which is unavailable in large swaths of the state. Interestingly, fuel cells are not proving to be a big draw. While manufactured in the state and promoted heavily, they are very expensive and several town leaders said their waste heat -- while useful in many circumstances -- is more than municipal facilities need.

There are also knotty legal issues: the use of utility-owned power lines by non-utility entities (it will be allowed in the pilot projects) and the merging of groups unaccustomed to being business partners.

"This is kind of a nascent or emerging area," Bourgeois said. "How do you stage these projects? How do you finance these projects? What are the business arrangements? What are the business models that would best organize these parties? That's one of the issues that people kind of bump up against."

And such uncertainties can make investors nervous, which makes financing difficult.



Limited natural gas distribution in some parts of the state adds another complication to setting up a micro-grid.

Ed Boman, the director of public works in Fairfield, is learning all of it the hard way as he puts the finishing touches on two microgrid proposals.

"We're trying to do three things here:" he said, "Increase reliability in an emergency event. We're trying to look at increasing our use of green power and we're trying to do it at a reduced cost to taxpayers.

"It's pretty hard to do."

One proposal is for a grid that operates the police and fire departments, the 911 office, a homeless shelter and a multiple-use cell tower. It would tie together an existing natural gas generator that runs 24/7 except in emergencies (and make it able to run in emergencies), an existing emergency

diesel generator and a proposed solar array. To finance the solar, Fairfield would opt for a power-purchase agreement, which means an outside company would own the panels and sell the power to Fairfield at a lower-than-grid price.

The other system would handle the wastewater treatment plant and neighboring transfer station, compost facility and public works garage with existing natural gas turbines and a solar system - adding to it additional solar and a fuel cell power, both through power-purchase agreements, as well as a system for using waste methane gas for power and heat and additional diesel generators as needed.

"I thought the intention was to take critical facilities and put as many generating units together," Boman said. "To do just one thing -- anybody can do that.

A generation facility similar to the one Norwich Public Utilities wants to set up as a microgrid project.